



FCC LISTED, REGISTRATION
NUMBER: 720267

ISED LISTED REGISTRATION
NUMBER 4621A-1

Informe de ensayo nº:
Test report No:

NIE: 55357RRF.002

Partial test report

USA FCC Part 15.407, 15.209
CANADA RSS-247, RSS-Gen

Unlicensed National Information Infrastructure (U-NII) Devices. General technical requirements.
Radiated emission limits; general requirements.
Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt
Local Area Network (LE-LAN) Devices.
General Requirements and Information for the Certification of Radio Apparatus.

Identificación del objeto ensayado.....: Identification of item tested	Automotive Radio with Navigation
Marca Trademark	Panasonic
Modelo y/o referencia tipo Model and /or type reference	CA-180-CTPL-HS
Other identification of the product	S/N: TM9198700756 FCC ID: ACJ-CA180CTPLHS IC: 216A-CA180CTPLHS
Final HW version	CA180CTPLHS US HW
Final SW version	CA180CTPLHS US SW
Características Features	Car Radio with Navi, AM/FM Tuner, Class D Amp, GPS/GLONASS, Bluetooth, Wi-Fi, Cellular, SXM, HD Radio
Solicitante Applicant	For FCC: Panasonic Corporation of North America Two Riverfront Plaza, 9th Floor, 07102-5490, Newark, New Jersey, USA For IC: Panasonic Canada Inc. 5770 Ambler Drive, Mississauga, ON L4W 2T3 Canada
Método de ensayo solicitado, norma.....: Test method requested, standard	USA FCC Part 15.407 10-1-16 Edition: Unlicensed National Information Infrastructure (U-NII) Devices. General technical requirements. Band U-NII-3 (5725 MHz – 5850 MHz). USA FCC Part 15.209 10-1-16 Edition: Radiated emission limits; general requirements. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 4 (November 2014). FCC 15.407 Subclause (b) (4) / RSS-247 Clause 6.2.4.2. Undesirable emission limits (band 5725-5850 MHz) ANSI C63.10-2013: American National Standard for Testing Unlicensed

	Wireless Devices. Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices 789033 D02 General U-NII Test Procedures New Rules v01r04 dated May 2, 2017.	
Aprobado por (nombre / cargo y firma) Approved by (name / position & signature)	A. Llamas RF Lab. Manager	 Firmado digitalmente por ALEJANDRO LLAMAS RODRIGUEZ Fecha: 2018.02.06 10:31:12 +01'00'
Fecha de realización Date of issue	2018-02-06	
Formato de informe No. Report template No	FDT08_20	

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Competences and guarantees

DEKRA Testing and Certification is a testing laboratory accredited by the National Accreditation Body (ENAC - Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification is a laboratory with a measurement facility in compliance with the requirements of Section 2.948 of the FCC rules and has been added to the list of facilities whose measurements data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Registration Number: 720267.

DEKRA Testing and Certification is a laboratory with a measurement site in compliance with the requirements of RSS 212, Issue 1 (Provisional) and has been added to the list of filed sites of the Canadian Certification and Engineering Bureau. Reference File Number: ISED 4621A-1.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification has a calibration and maintenance program for its measurement equipment.

the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification at the time of performance of the test.

DEKRA Testing and Certification is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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1. This report is only referred to the item that has undergone the test.
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Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification internal document PODT000.

Usage of samples

Samples undergoing test have been selected by: **the client**

Sample S/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
55344/003	Mini USB – USB cable	---	---	2017-10-19
55344/004	AC/DC Charger	---	---	2017-10-19
55344/005	Radio Device	SilverBox	TM9198700756	2017-10-19
51334/008	RF cable	1557832-1	---	2017-04-11
51334/017	BT Antenna	P68306857AA	50085	2017-04-11
51334/032	Display	---	T000000129847	2017-04-11
48193D/035	Antenna	---	---	2016-05-04
48193D/050	USB hub	DUB-H7	DL481E3002717	2016-05-17
48193D/055	Pendrive	---	---	2016-05-17
48193D/072	Antenna	---	---	2016-05-24
48278D/006	DC Power cable	---	---	2017-03-15
52037/136	Ethernet cable	---	---	2017-05-22
52037/171	USB to Ethernet adapter	---	---	2017-06-08

1. Sample S/01 has undergone following test(s).

All radiated tests indicated in appendix A.

Test sample description

The test sample consists of a Car Radio with Navigation, AM/FM Tuner, Class D Amp, GPS/GLONASS, Bluetooth, Wi-Fi, Cellular, SXM, HD Radio.

Identification of the client

For FCC:

Panasonic Corporation of North America

Two Riverfront Plaza, 9th Floor, 07102-5490 Newark, New Jersey, USA

For ISED:

Panasonic Canada Inc.

5770 Ambler Drive, Mississauga ON L4W 2T3 Canada

Testing period

The performed test started on 2017-11-01 and finished on 2017-11-02.

The tests have been performed at DEKRA Testing and Certification.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

Remarks and comments

1; The tests have been performed by the technical personnel: Pedro Parada, José Alberto Aranda and Carlos Alberto Contreras.

2: Test not requested. Only radiated spurious emissions for 802.11a (6 Mbps) mode for the lowest channel was performed.

3: Used instrumentation:

Radiated Measurements

		Last Cal. date	Cal. due date
1.	Semianechoic Absorber Lined Chamber ETS FACT3 200STP	N.A.	N.A.
2.	BiconicalLog antenna ETS LINDGREN 3142E	2017/07	2020/04
3.	Multi Device Controller EMCO 2090	N.A.	N.A.
4.	Double-ridge Guide Horn antenna 1-18 GHz SCHWARZBECK BBHA 9120 D	2016/11	2019/11
5.	Broadband Horn antenna 18-40 GHz SCHWARZBECK BBHA 9170	2017/03	2020/03
6.	EMI Test Receiver R&S ESU 40	2016/03	2018/03
7.	Spectrum analyser Rohde & Schwarz FSW50	2015/12	2017/12
8.	RF pre-amplifier 30 MHz-6 GHz BONN BLNA 0360-01N	2017/07	2018/07
9.	RF pre-amplifier 1-18 GHz Bonn Elektronik BLMA 0118-1M	2016/02	2018/02
10.	RF pre-amplifier 18-40 GHz BONN ELEKTRONIK BLMA 1840-1M	2015/12	2017/12

Testing verdicts

Not applicable	N/A
Pass	P
Fail	F
Not measured	N/M

1. 5.725 GHz – 5.85 GHz Band

FCC PART 15 / RSS -247 PARAGRAPH		VERDICT			
		NA	P	F	NM
15.407 (a) (3) / RSS-247 Clause 6.2.4.1.	Power limits. Maximum output power				NM ²
15.407 (a) (3) / RSS-247 Clause 6.2.4.1.	Maximum power spectral density				NM ²
15.407 (e) / RSS-247 Clause 6.2.4.1.	6 dB bandwidth.				NM ²
15.407 (b) (4), (6), (7) / RSS-247 Clause 6.2.4.2.	Undesirable radiated emissions (Transmitter)		P		
15.407 (g)	Frequency stability				NM ²

2: See remarks and comments.

2. Common requirements for all bands

FCC PART 15 PARAGRAPH / RSS-247		VERDICT			
		NA	P	F	NM
15.407 (c) / RSS-247 Clause 6.4.	Transmission in case of absence of information to transmit, or operational failure.				NM ²

2: See remarks and comments.

Appendix A – Test result (WiFi 5 GHz)

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TEST CONDITIONS

Power supply (V):

$V_{\text{nominal}} = 12.0 \text{ Vdc}$

Type of power supply = External power supply (Battery).

Type of antenna: External antenna

Declared Gain for antenna (maximum) = +5 dBi

TEST FREQUENCIES:

Lowest Channel for mode 802.11a: 5745 MHz

RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-40 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

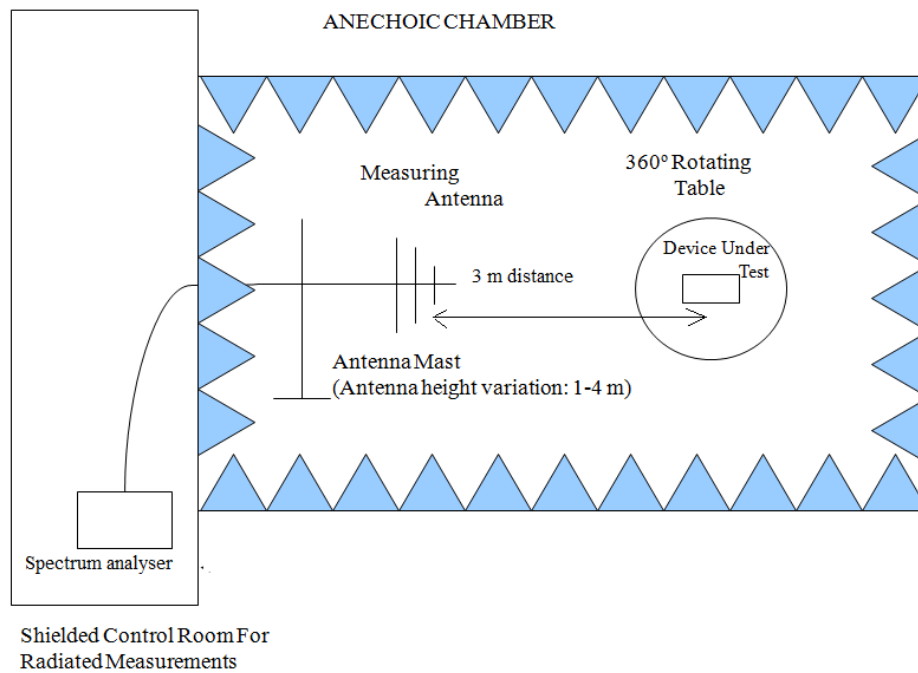
For radiated emissions in the range 1 GHz-40 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission.

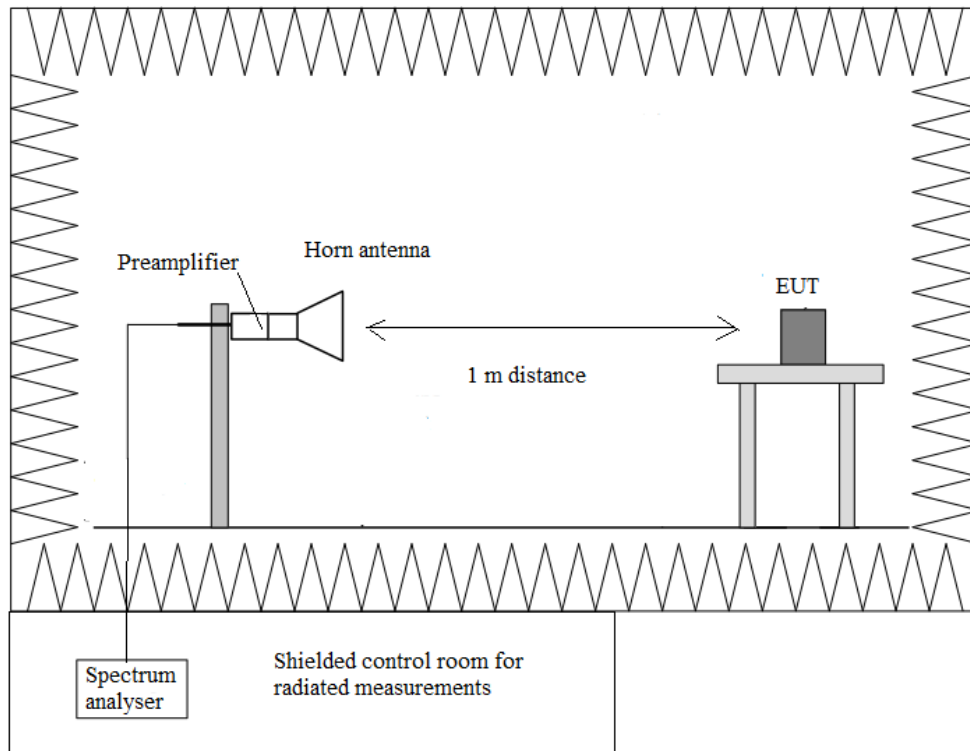
It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

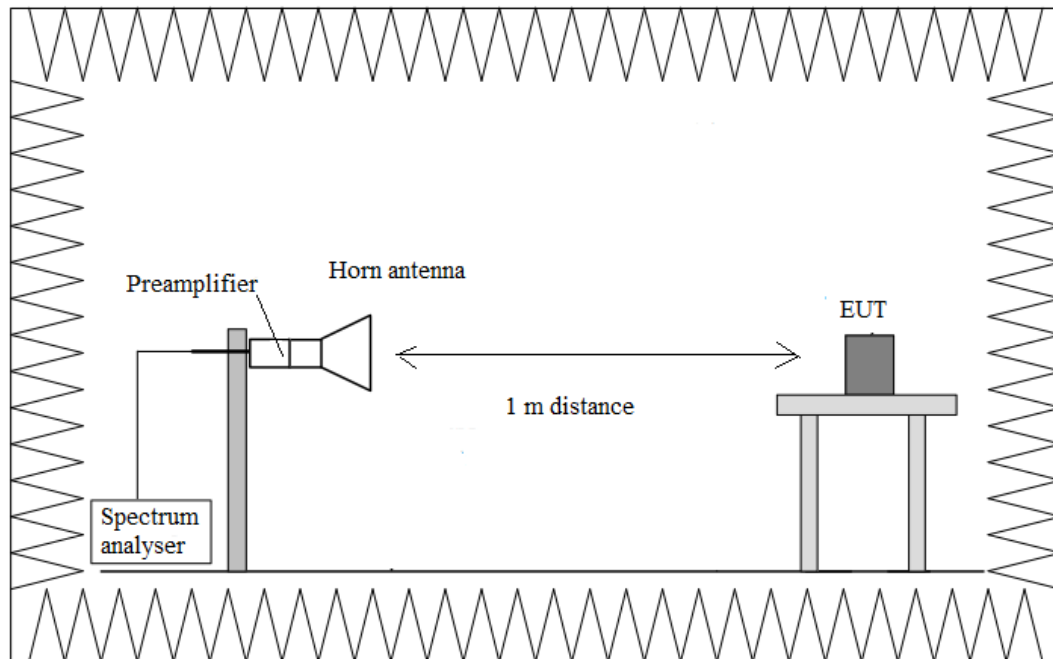
Radiated measurements setup $f < 1$ GHz



Radiated measurements setup $f > 1$ GHz up to 18 GHz



Radiated measurements setup $f > 18$ GHz up to 40 GHz



Section 15.407 (b) (4), (6), (7) / RSS-247 Clause 6.2.4.2. Undesirable radiated emissions (Transmitter) 1 to 40 GHz

SPECIFICATION

All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)/RSS-Gen):

Frequency Range (MHz)	Field strength (μ V/m)	Field strength (dB μ V/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-1000 MHz and at distance of 1m for the frequency range 1 GHz-40 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

A preliminary scan was performed and determined 802.11a (6 Mbps) mode for the lowest channel (5745 MHz) as the worst case. The tables and plots below show the results for this worst case.

Frequency range 30 MHz-1000 MHz.

Mode: 802.11a (6Mbps)

CHANNEL: LOWEST (5745 MHz).

Spurious levels operating (radiated) closest to limit.

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
32.5500	V	Quasi-Peak	32.55	± 3.88
119.9675	V	Quasi-Peak	28.10	± 3.88
169.9710	H	Quasi-Peak	24.60	± 3.88
239.0350	V	Quasi-Peak	31.50	± 3.88
400.0065	H	Quasi-Peak	30.10	± 3.88
403.1590	V	Quasi-Peak	29.80	± 3.88
665.5925	H	Quasi-Peak	33.00	± 3.88
681.2095	V	Quasi-Peak	35.90	± 3.88
717.9720	H	Quasi-Peak	25.40	± 3.88
785.4845	V	Quasi-Peak	26.40	± 3.88
798.6280	V	Quasi-Peak	34.70	± 3.88
811.0925	V	Quasi-Peak	29.10	± 3.88
945.0010	H	Quasi-Peak	34.30	± 3.88
960.0845	V	Quasi-Peak	37.40	± 3.88

Frequency range 1 GHz-40 GHz

The results in the next tables show the maximum measured levels in the 1-40 GHz range (see next plots).

Spurious signals with peak levels above the average limit (54 dB μ V/m at 3 m) are measured with an average detector for checking compliance with the average limit.

Mode: 802.11a (6Mbps)

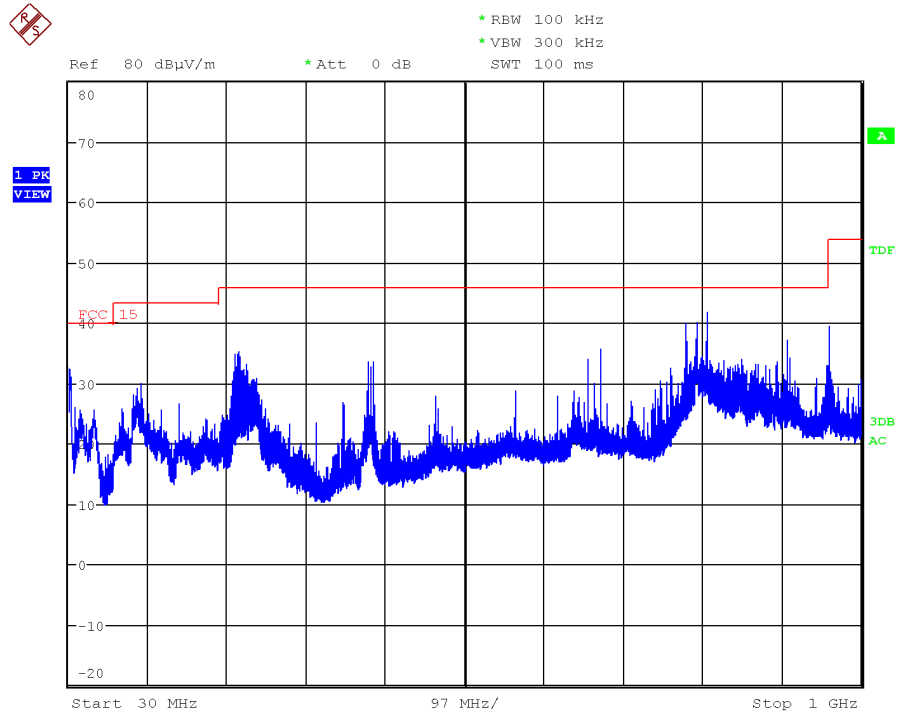
CHANNEL: LOWEST (5745 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
3.6683	H	Peak	48.62	± 4.87
7.6606	H	Peak	46.29	± 4.87

Verdict: PASS

FREQUENCY RANGE 30 MHz-1000 MHz.

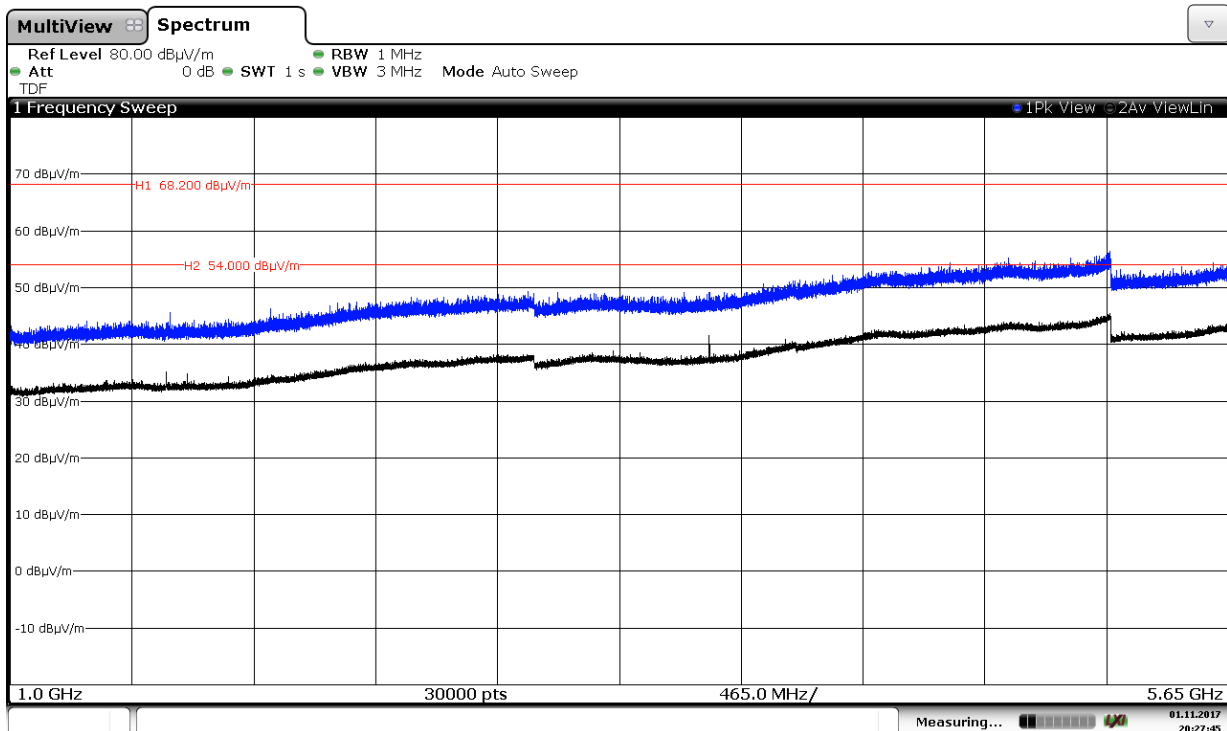
CHANNEL: LOWEST (5745 MHz).



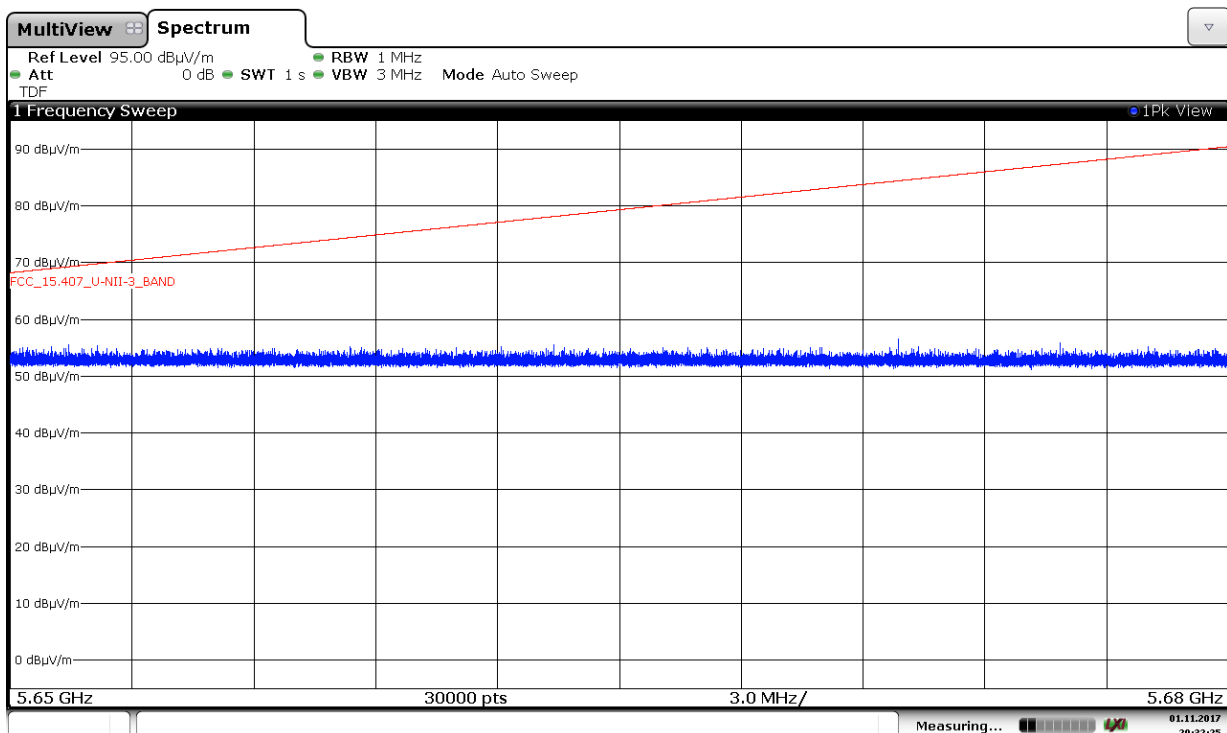
FREQUENCY RANGE 1 GHz to 7 GHz.

CHANNEL: LOWEST (5745 MHz).

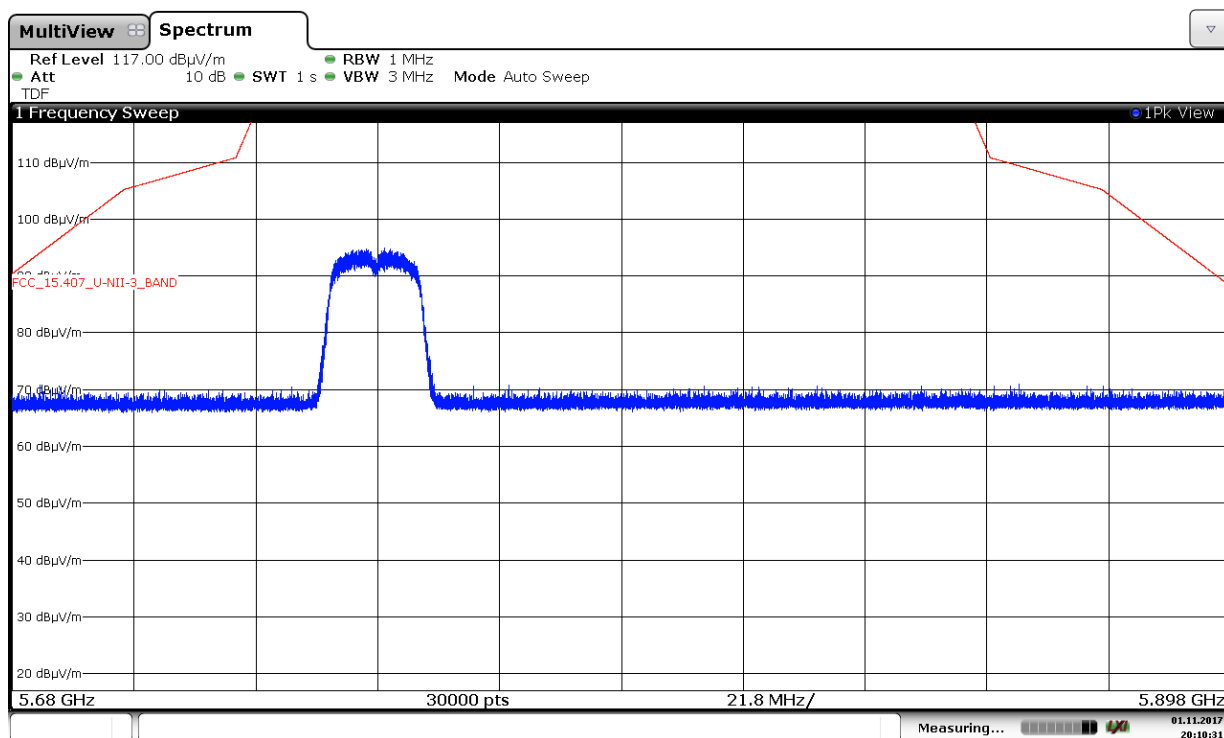
1. Range 1 GHz to 5.65 GHz.



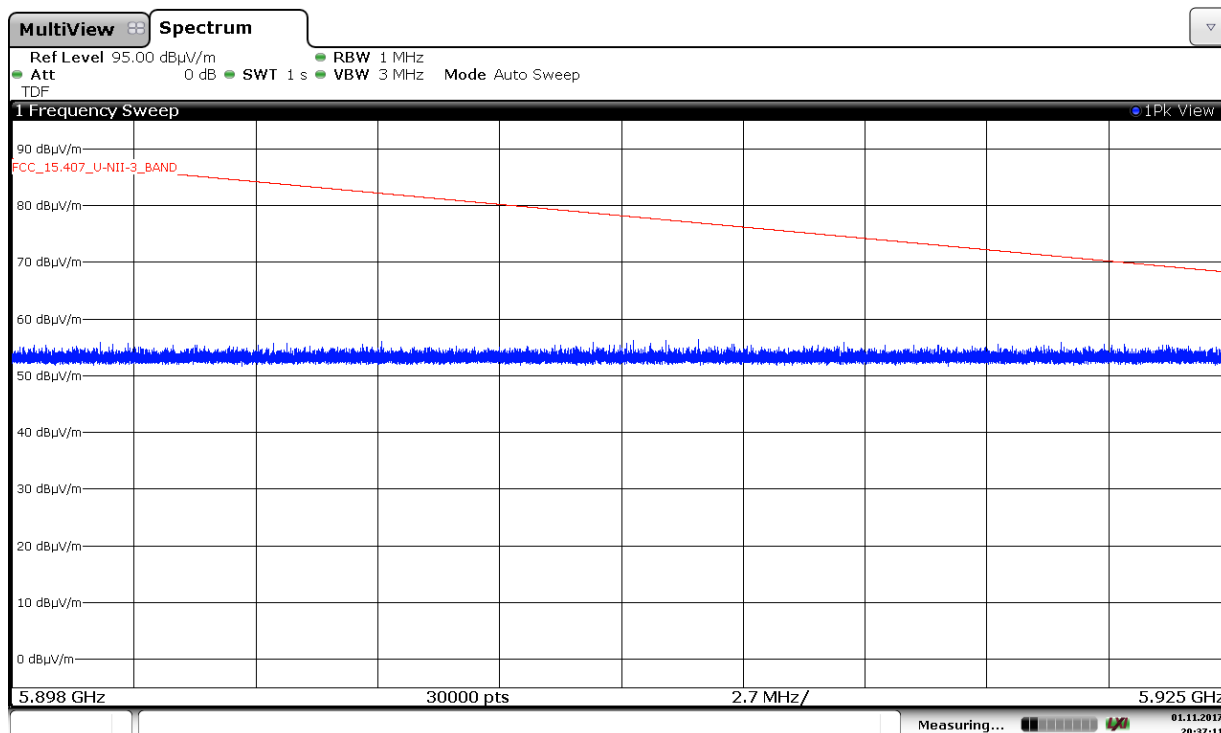
2. Range 5.65 GHz to 5.68 GHz.



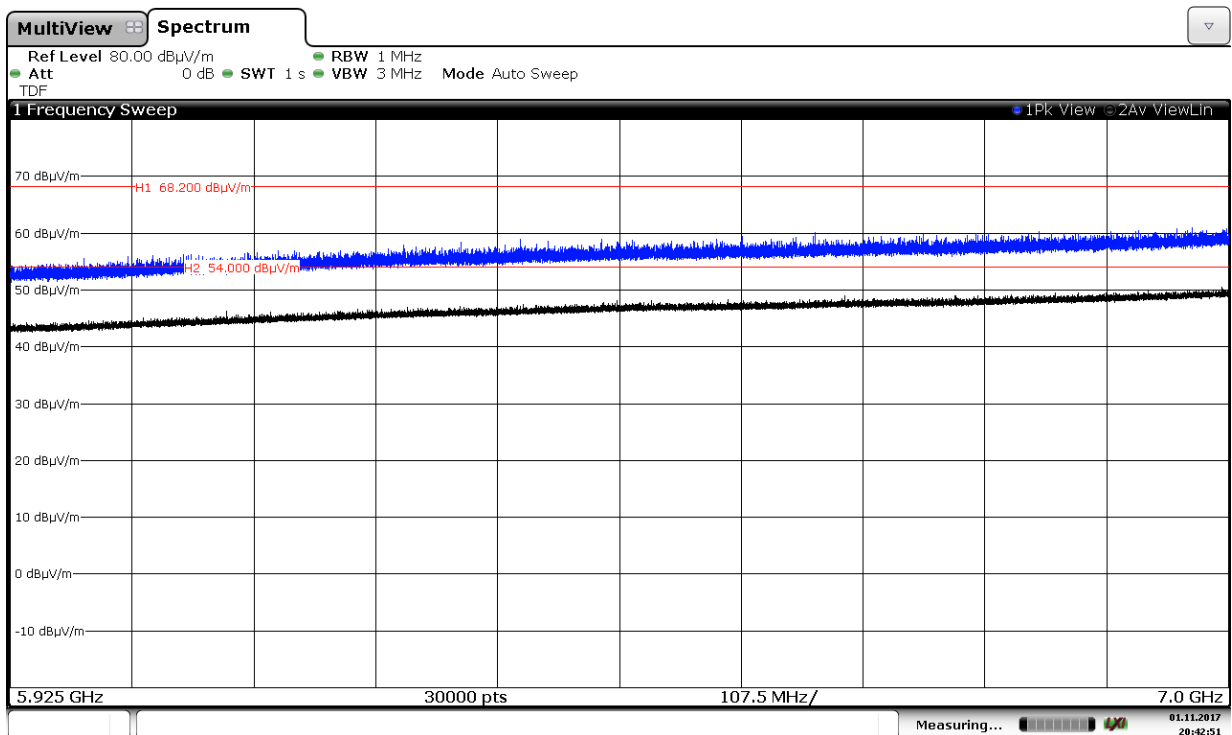
3. Range 5.68 GHz to 5.898 GHz.



4. Range 5.898 GHz to 5.925 GHz

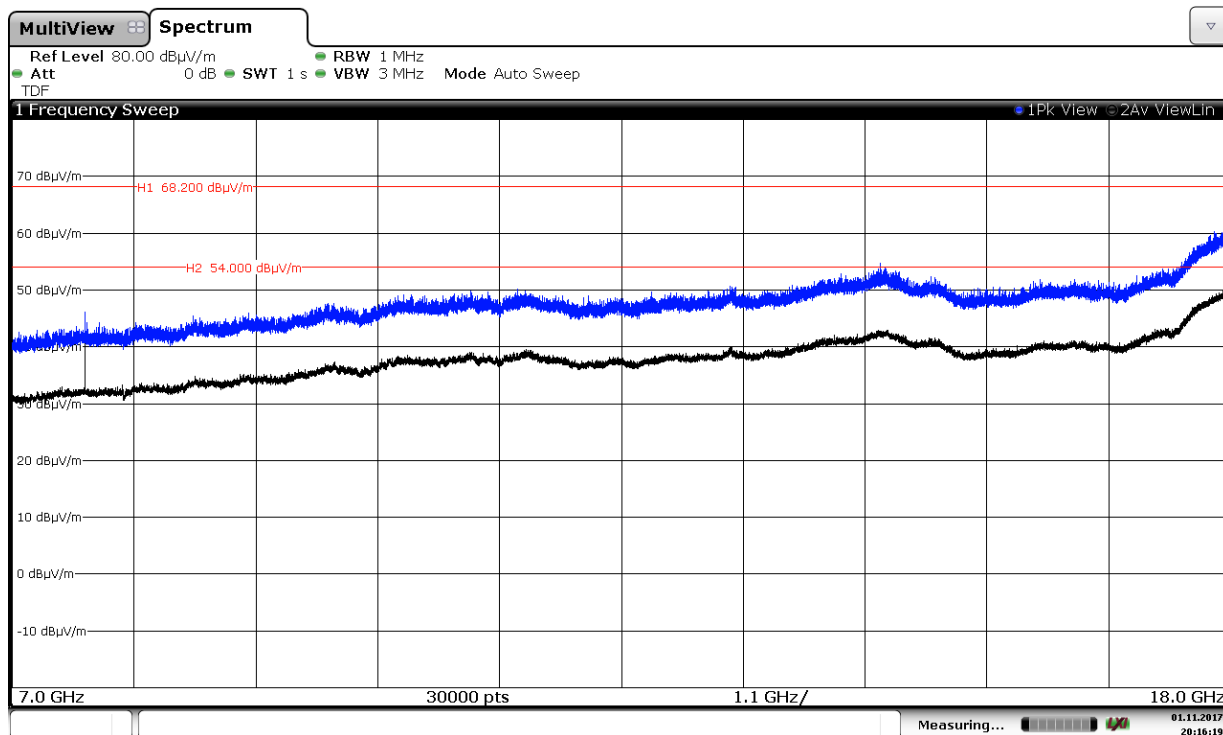


5. Range 5.925 GHz to 7 GHz



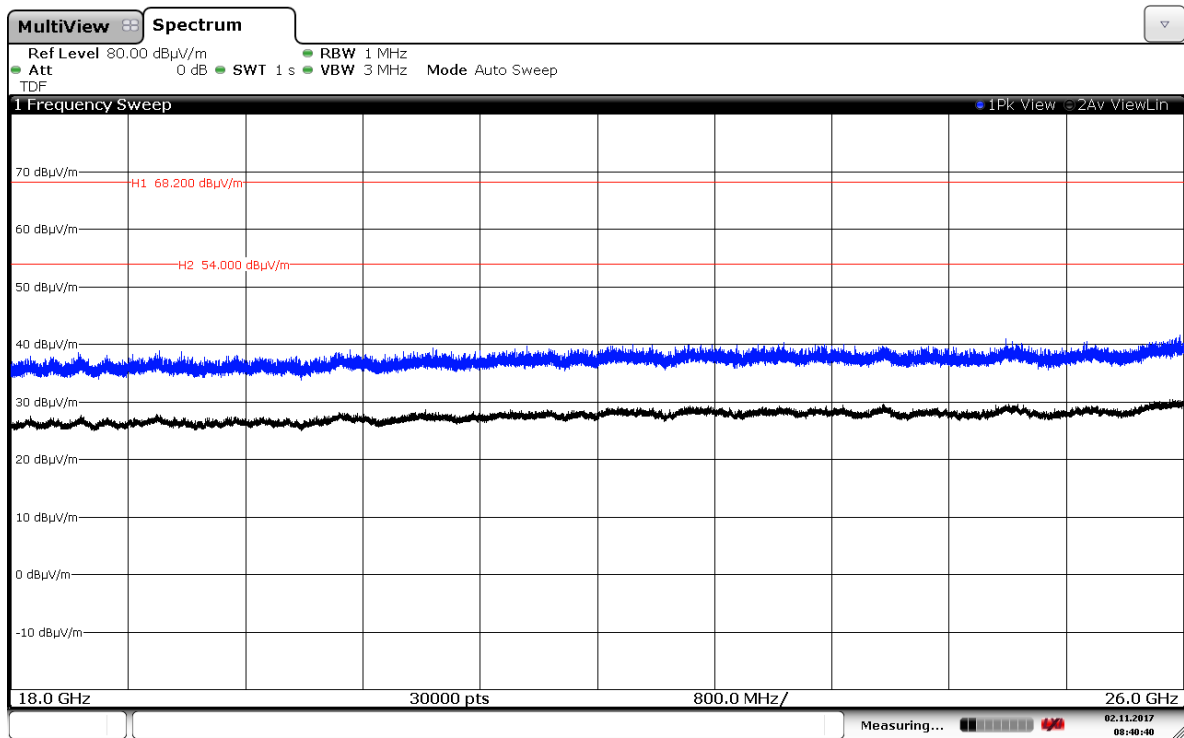
FREQUENCY RANGE 7 GHz to 18 GHz.

CHANNEL: LOWEST (5745 MHz).



FREQUENCY RANGE 18 GHz to 26 GHz.

CHANNEL: LOWEST (5745 MHz).



FREQUENCY RANGE 26 GHz 40GHz.

CHANNEL: LOWEST (5745 MHz).

